

REMARKS

This is in response to the Office Action of April 22, 2002. Claims 1, 3, 4, 8-10, 12 and 16-21 are pending and Claims 18-19 are withdrawn from consideration. Claims 1, 3, 4, 8-10, 12, 16, 17, 20, and 21 have been rejected.

By this response and amendment, the Claims drawn to the non-elected invention have been cancelled, the rejected Claims have been cancelled, and New Claims 22-35, have been added.

In view of the amendments above and remarks below, Applicant respectfully requests reconsideration and further examination.

The Invention

The present invention relates generally to the field of chemical mechanical polishing, and more particularly to polishing pads that have two or more polishing regions with each polishing region having distinct polishing characteristics which are different from those of the other polishing region(s). These polishing regions, which have different polishing characteristics, are arranged such that a workpiece to be polished, e.g., a wafer, can be selectively frictionally engaged with a particular one of those regions. For example, consistent with the present invention, the polishing regions may be disposed on a circular polishing pad as concentric annular regions. In a further example, the polishing regions may be disposed as parallel linear regions on a linear pad (e.g., belt). By arranging these regions of distinct polishing characteristics such that a wafer may be selectively polished by only one region when it is selectively placed in contact with that portion of a polishing pad, enables methods wherein the amount of time of polishing with those regions of distinct polishing characteristics may be controlled to achieve a desired polishing result. Polishing pads configured in accordance with the present invention, may have a uniform top layer with distinct underlying regions which impart the different polishing characteristics to the polishing regions. Alternatively, such polishing pads may have a uniform underlayer with a top

layer having distinct regions of hardness, surface texture, or any other attribute that affects polishing characteristics.

Claims 18-19

Claims 18-19 have been withdrawn from consideration in this application because they are directed to a non-elected invention.

By this amendment, Claims 18-19 have been cancelled from this application. A divisional application directed to the invention of Claims 18-19 has been filed (Serial No. 09/572,564).

New Claims 22 - 35

New Claims 22-35 are drawn to Applicants' invention of polishing pads suitable for chemical mechanical polishing of wafers where those pads have two or more regions, each of those regions has a different polishing characteristic, and where the wafer may be selectively placed in frictional contact with any particular region of the polishing pad for a predetermined amount of time, where that predetermined amount of time is independent of the motion of the polishing pad. In other words, a wafer to be polished can be placed on a region of the polishing pad having a certain polishing characteristic, and, regardless of whether the pad moves radially (e.g., as with a circular pad) or linearly (e.g., as with a belt), the wafer can remain in the region having the selected polishing characteristic until it is moved, under control of the polishing machine, to another region having a different polishing characteristic.

Support for these Claims can be found in the specification at page 6, lines 14-26; page 18, lines 10-25; and page 19, lines 3-27; and in Figures 2A, 2B, 3, 4A, 4B, 5A, 5B, 5C, 6, and 7B.

Rejections under 35 USC 102(e) and 103(a)

Claims 1, 3, 8, 10, 12, 16, 20, and 21, have been rejected under 35 USC 102(e) as being anticipated by Cote, et al., (US patent 5,534,106), or in the alternative as obvious over Cote, et al., for the reasons that the Examiner set forth in the Office Action of October 5, 2001. Claims 4, 9, and 17 have been rejected under 35 USC 103(a) as set forth in the Office Action of October 5, 2001.

Cote, et al., disclose chemical mechanical polishing of wafers using a polishing pad that has two or more regions of different polishing characteristics. The regions of the pads shown and described by Cote, et al., are arranged as wedges, or alternatively as half circles, such that a wafer is exposed to each of the regions during each rotation of the pad. See, for example, column 6, lines 54-59, where it is stated: "Since both pad 202 and wafer are rotating, the wafer undergoes alternating abrasion and polishing. This cycle is continuously repeated with each rotation of pad 202, to provide continuous application of alternating abrasion and polishing to the wafer."

The rejected Claims have been cancelled, and New Claims 22-35, consistent with the specification, have been added by this amendment.

The invention defined by Applicants' New Claims require that the regions of different polishing characteristics be disposed either as concentric annular regions for circular pads, or as parallel linear regions for polishing pads that are configured as linear belts. This is in contradistinction to Cote, et al., which teach pad configurations designed to continuously expose the wafer to the different polishing regions with each rotation of the polishing pad. Various dependent Claims recite limitations with respect to the nature of a top layer of the polishing pad, a bottom layer of the polishing pad, and with respect to size of the regions of distinct polishing characteristics in view of the size of the workpiece, i.e., wafer, to be polished.

For at least these reasons, Applicants' New Claims are distinguishable from the disclosure of Cote, et al. Further, there is no suggestion or motivation in Cote, et al., for the polishing pads defined by Applicants' New Claims. In view of the foregoing, Applicants respectfully submit that the rejections based on Cote, et al., have been overcome.

Correspondence Address

In a previously submitted paper entitled "Changing of Correspondence Address, Atty Docket Number, Revocation of Attorney", dated March 21, 2002, Express Mail Label No. EL595958487US, the correspondence address of record for this application was changed to:

Corporate Patent Counsel
Philips Electronics North America Corporation
580 White Plains Road
Tarrytown, NY 10591

Please send correspondence to this address of record.

Conclusion

All of the rejections of the Office Action of April 22, 2002, have been responded to herein, and Applicants submit that the pending Claims 22-35 are now in condition for allowance.

Attached hereto is a marked-up version of the changes made to the specification by the current amendment. The attached page is captioned "Version with markings to show changes made".

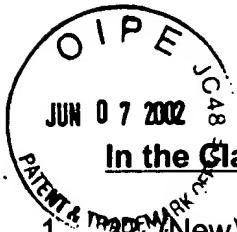
Applicants respectfully request that a timely Notice of Allowance be issued in this case.

Respectfully submitted,

By Raymond J. Werner

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Dated: May 30, 2002
Portland, Oregon

Version with markings to show changes madeIn the Claims

1 22. (New) A polishing pad suitable for chemical mechanical polishing of wafers,

2 comprising:

3 a circular base layer and an overlying circular top layer, the overlying circular top

4 layer forming the polishing surface of the polishing pad;

5 wherein the polishing surface of the polishing pad has at least two polishing

6 regions thereon, the at least two polishing regions having distinct polishing

7 characteristics, and wherein the at least two polishing regions are disposed on the

8 polishing pad as concentric annular regions.

1 23. (New) The polishing pad of Claim 22, wherein the circular base layer

2 comprises at least two concentric annular regions, each of the at least two base

3 layer concentric annular regions disposed so as to underlie a corresponding one

4 of the at least two polishing regions.

1 24. (New) The polishing pad of Claim 23, wherein each of the at least two base

2 layer concentric annular regions has a hardness that is different from the others

3 of the at least two base layer concentric annular regions.

1 25. (New) The polishing pad of Claim 23, wherein each of the at least two base

2 layer concentric annular regions has a thickness that is different from the others

3 of the at least two base layer concentric annular regions.

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1 26. (New) The polishing pad of Claim 22, wherein the circular top layer
2 comprises at least two concentric annular regions, each of the at least two top
3 layer concentric annular regions disposed so as to correspond with a single one
4 of the at least two polishing regions; and each of the at least two top layer
5 concentric annular regions having different polishing characteristics.

1 27. (New) The polishing pad of Claim 22, wherein the circular top layer
2 comprises at least two concentric annular regions, each of the at least two top
3 layer concentric annular regions disposed so as to correspond with a single one
4 of the at least two polishing regions; and each of the at least two top layer
5 concentric annular regions having different surface textures.

1 28. (New) The polishing pad of Claim 22, wherein the at least two polishing
2 regions are each of a size such that the wafer can be frictionally engaged with
3 one of the at least two concentric annular polishing regions without
4 simultaneously being engaged with others of the at least two concentric annular
5 polishing regions.

1 29. (New) A polishing pad suitable for chemical mechanical polishing of wafers,
2 comprising:
3 a linear base layer and an overlying linear top layer, the overlying linear
4 top layer forming the polishing surface of the polishing pad;
5 wherein the polishing surface of the polishing pad has at least two
6 polishing regions thereon, the at least two polishing regions having distinct

7 polishing characteristics, and wherein the at least two polishing regions are
8 disposed on the polishing pad as parallel linear regions.

1 30. (New) The polishing pad of Claim 29, wherein the at least two polishing
2 regions are each of a size such that the wafer can be frictionally engaged with
3 one of the at least two parallel linear polishing regions without simultaneously
4 being engaged with others of the at least two parallel linear polishing regions.

1 31. (New) The polishing pad of Claim 29, wherein the linear base layer
2 comprises at least two parallel linear regions, each of the at least two base layer
3 parallel linear regions disposed so as to underlie a corresponding one of the at
4 least two polishing regions.

1 32. (New) The polishing pad of Claim 31, wherein each of the at least two base
2 layer parallel linear regions has a hardness that is different from the others of the
3 at least two base layer parallel linear regions.

1 33. (New) The polishing pad of Claim 31, wherein each of the at least two base
2 layer parallel linear regions has a thickness that is different from the others of the
3 at least two base layer parallel linear regions.

1 34. (New) The polishing pad of Claim 29, wherein the linear top layer comprises
2 at least two parallel linear regions, each of the at least two top layer parallel
3 linear regions disposed so as to correspond with a single one of the at least two
4 polishing regions; and each of the at least two top layer parallel linear regions
5 having different polishing characteristics.

- 1 35. (New) The polishing pad of Claim 29, wherein the linear top layer comprises at least
- 2 two parallel linear regions, each of the at least two top layer parallel linear regions
- 3 disposed so as to correspond with a single one of the at least two polishing regions; and
- 4 each of the at least two top layer parallel linear regions having different surface textures.